





Centers for Disease Control and Prevention  
CDC 24/7: Saving Lives. Protecting People.™

## Frequently Asked Questions (FAQ) About Extreme Heat

### What happens to the body as a result of exposure to extreme heat?



People suffer heat-related illness when the body's temperature control system is overloaded. The body normally cools itself by sweating. But under some conditions, sweating just isn't enough. In such cases, a person's body temperature rises rapidly. Very high body temperatures may damage the brain or other vital organs. Several factors affect the body's ability to cool itself during extremely hot weather. When the humidity is high, sweat will not evaporate as quickly, preventing the body from releasing heat quickly. Other conditions that can limit the ability to regulate temperature include old age, youth (age 0-4), obesity, fever, dehydration, heart disease, mental illness, poor circulation, sunburn, and prescription drug use and alcohol use.

### Who is at greatest risk for heat-related illness?

Those at greatest risk for heat-related illness include infants and children up to four years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications.

### What is heat stroke?

Heat stroke is the most serious heat-related illness. It occurs when the body becomes unable to control its temperature: the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. Body temperature may rise to 106°F or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not provided.

### What are the warning signs of a heat stroke?



Warning signs of heat stroke vary but may include the following:

- An extremely high body temperature (above 103°F)
- Red, hot, and dry skin (no sweating)
- Rapid, strong pulse
- Throbbing headache
- Dizziness
- Nausea
- Confusion
- Unconsciousness

## **What should I do if I see someone with any of the warning signs of heat stroke?**

If you see any of these signs, you may be dealing with a life-threatening emergency. Have someone call for immediate medical assistance while you begin cooling the victim. Do the following:

- Get the victim to a shady area.
- Cool the victim rapidly, using whatever methods you can. For example, immerse the victim in a tub of cool water; place the person in a cool shower; spray the victim with cool water from a garden hose; sponge the person with cool water; or if the humidity is low, wrap the victim in a cool, wet sheet and fan him or her vigorously.
- Monitor body temperature and continue cooling efforts until the body temperature drops to 101-102°F.
- If emergency medical personnel are delayed, call the hospital emergency room for further instructions.
- Do not give the victim alcohol to drink.
- Get medical assistance as soon as possible.

## **What is heat exhaustion?**

Heat exhaustion is a milder form of heat-related illness that can develop after several days of exposure to high temperatures and inadequate or unbalanced replacement of fluids. Those most prone to heat exhaustion are elderly people, those with high blood pressure, and those working or exercising in a hot environment.

## **What are the warning signs of heat exhaustion?**

The warning signs of heat exhaustion include the following:

- Heavy sweating
- Paleness
- Muscle cramps
- Tiredness
- Weakness
- Dizziness
- Headache
- Nausea or vomiting
- Fainting

The skin may be cool and moist. The pulse rate will be fast and weak, and breathing will be fast and shallow. If heat exhaustion is untreated, it may progress to heat stroke. See medical attention if symptoms worsen or last longer than one hour.





## **What steps can be taken to cool the body during heat exhaustion?**

- Drink cool, nonalcoholic beverages.
- Rest.
- Take a cool shower, bath, or sponge bath.
- Seek an air-conditioned environment.
- Wear lightweight clothing.

## **What are heat cramps and who is affected?**

Heat cramps are muscle pains or spasms – usually in the abdomen, arms, or legs – that may occur in association with strenuous activity. People who sweat a lot during strenuous activity are prone to heat cramps. This sweating depletes the body's salt and moisture. The low salt level in the muscles causes painful cramps. Heat cramps may also be a symptom of heat exhaustion. If you have heart problems or are on a low-sodium diet, seek medical attention for heat cramps.

## **What should I do if I have heat cramps?**

If medical attention is not necessary, take the following steps:

- Stop all activity and sit quietly in a cool place.
- Drink clear juice or a sports beverage.
- Do not return to strenuous activity for a few hours after the cramps subside because further exertion may lead to heat exhaustion or heat stroke.
- Seek medical attention for heat cramps if they do not subside in 1 hour.



## **What is heat rash?**

Heat rash is a skin irritation caused by excessive sweating during hot, humid weather. It can occur at any age but is most common in young children. Heat rash looks like a red cluster of pimples or small blisters. It is more likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases.

## **What is the best treatment for heat rash?**

The best treatment for heat rash is to provide a cooler, less humid environment. Keep the affected area dry. Dusting powder may be used to increase comfort.

## **Can medications increase the risk of heat-related illness?**

The risk for heat-related illness and death may increase among people using the following drugs: (1) psychotropics, which affect psychic function, behavior, or experience (e.g. haloperidol or chlorpromazine); (2) medications for Parkinson's disease, because they can inhibit perspiration; (3) tranquilizers such as phenothiazines, butyrophenones, and thioanthenes; and (4) diuretic medications or "water pills" that affect fluid balance in the body.



## **How effective are electric fans in preventing heat-related illness?**

Electric fans may provide comfort, but when the temperature is in the high 90s, fans will not prevent heat-related illness. Taking a cool shower or bath or moving to an air-conditioned place is a much better way to cool off. Air conditioning is the strongest protective factor against heat-related illness. Exposure to air conditioning for even a few hours a day will reduce the risk for heat-related illness. Consider visiting a shopping mall or public library for a few hours.

## **How can people protect their health when temperatures are extremely high?**

Remember to keep cool and use common sense. Drink plenty of fluid, replace salts and minerals, wear appropriate clothing and sunscreen, pace yourself, stay cool indoors, schedule outdoor activities carefully, use a buddy system, monitor those at risk, and adjust to the environment.

## **How much should I drink during hot weather?**

During hot weather you will need to drink more liquid than your thirst indicates. Increase your fluid intake, regardless of your activity level. During heavy exercise in a hot environment, drink two to four glasses (16-32 ounces) of cool fluids each hour. Avoid drinks containing alcohol because they will actually cause you to lose more fluid.

## **Should I take salt tablets during hot weather?**

Do not take salt tablets unless directed by your doctor. Heavy sweating removes salt and minerals from the body. These are necessary for your body and must be replaced. The easiest and safest way to do this is through your diet. Drink fruit juice or a sports beverage when you exercise or work in the heat.



## What is the best clothing for hot weather or a heat wave?

Wear as little clothing as possible when you are at home. Choose lightweight, light-colored, loose-fitting clothing. In the hot sun, a wide-brimmed hat will provide shade and keep the head cool. If you must go outdoors, be sure to apply sunscreen 30 minutes prior to going out and continue to reapply according to the package directions. Sunburn affects your body's ability to cool itself and causes a loss of body fluids. It also causes pain and damages the skin.



## What should I do if I work in a hot environment?

Pace yourself. If you are not accustomed to working or exercising in a hot environment, start slowly and pick up the pace gradually. If exertion in the heat makes your heart pound and leaves you gasping for breath, STOP all activity. Get into a cool area or at least in the shade, and rest, especially if you become lightheaded, confused, weak, or faint.

This information provided by NCEH's Health Studies Branch (<http://www.cdc.gov/nceh/hsb/>).

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Centers for Disease Control and Prevention 1600 Clifton Rd. Atlanta, GA  
30333, USA  
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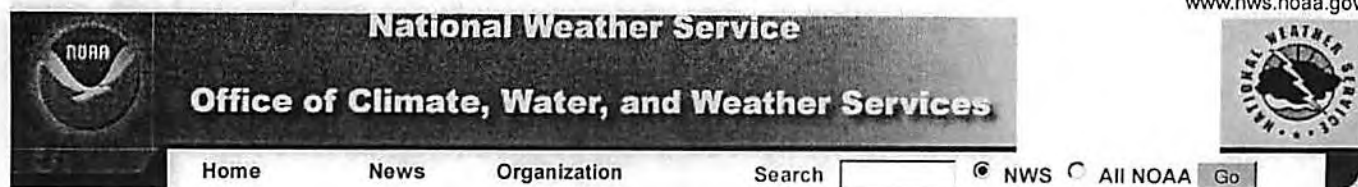
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Questions/Comments?



## Heat: A Major Killer

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- NOAA's Watch, Warning, and Advisory Products for Extreme Heat
- Heat Index Information
- Heat Hazards
- Heat-Related Illness Symptoms and First Aid
- How Fast Can the Sun Heat A Car?
- Vehicle Related Heat Deaths
- Preparing for and Responding to Excessive Heat Events

Heat is one of the leading weather-related killer in the United States, resulting in hundreds of fatalities each year. In the disastrous heat wave of 1980, more than 1,250 people died. In the heat wave of 1995 more than 700 deaths in the Chicago area were attributed to heat, making this the deadliest weather event in Chicago history. In August 2003, a record heat wave in Europe claimed an estimated 50,000 lives.

North American summers are hot; most summers see heat waves in one or more parts of the United States. East of the Rockies, they tend to combine both high temperatures and high humidity, although some of the worst heat waves have been catastrophically dry.



## NOAA's Watch, Warning, and Advisory Products for Extreme Heat

Each National Weather Service Forecast Office issues the following heat-related products as conditions warrant:

- **Excessive Heat Outlooks:** are issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to those who need considerable lead time to prepare for the event, such as public utility staff, emergency managers and public health officials. See the mean heat index and probability forecasts maps.
- **Excessive Heat Watches:** are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A Watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain. A Watch provides enough lead time so that those who need to prepare can do so, such as cities officials who have excessive heat event mitigation plans.
- **Excessive Heat Warning/Advisories** are issued when an excessive heat event is expected in the next 36 hours. These products are issued when an excessive heat event is occurring, is imminent, or has a very high probability of occurring. The warning is used for conditions posing a threat to life. An advisory is for less serious conditions that cause significant discomfort or inconvenience and, if caution is not taken, could lead to a threat to life.

## How Forecasters Decide Whether to Issue Excessive Heat Products

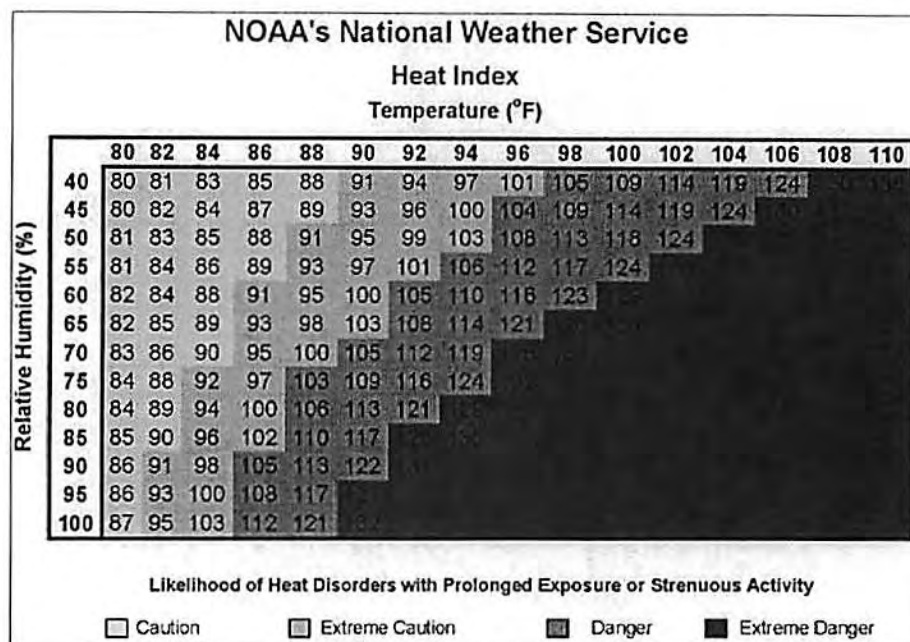
### How Forecasters Decide Whether to Issue Excessive Heat Products

NOAA's heat alert procedures are based mainly on Heat Index Values. The Heat Index, sometimes referred to as the apparent temperature is given in degrees Fahrenheit. The Heat Index is a measure of how hot it really feels when relative humidity is factored in with the actual air temperature.

To find the Heat Index temperature, look at the Heat Index chart below. As an example, if the air temperature is 96°F and the relative humidity is 65%, the heat index--how hot it feels--is 121°F. The National Weather Service will initiate



alert procedures when the Heat Index is expected to exceed 105°-110°F (depending on local climate) for at least 2 consecutive days. Nws also offers a Heat Index chart for area with high heat but low relative humidity.



**IMPORTANT:** Since heat index values were devised for shady, light wind conditions, **exposure to full sunshine can increase heat index values by up to 15°F.** Also, **strong winds**, particularly with very hot, dry air, can be extremely hazardous.

The Heat Index Chart shaded zone above 105°F (orange or red) shows a level that may cause increasingly severe heat disorders with continued exposure or physical activity.

## The Hazards of Excessive Heat

During extremely hot and humid weather the body's ability to cool itself is affected. When the body heats too rapidly to cool itself properly, or when too much fluid or salt is lost through dehydration or sweating, body temperature rises and heat-related illnesses may develop.

Heat-related illnesses can range from heat cramps to heat exhaustion to more serious heat stroke. Heat stroke can result in death and requires **immediate medical attention.**

Factors or conditions that can make some people more susceptible to heat-related illnesses include age (older adults and young children), obesity, fever, heart disease, mental illness, poor circulation, prescription drug and alcohol use, and sunburn. Sunburn, caused by ultraviolet radiation from the sun, can significantly retard the skin's ability to shed excess heat.



## Heat-Related Illness Symptoms and First Aid

### HEAT CRAMPS

- **Symptoms:**
  - Painful muscle cramps and spasms usually in legs and abdomen
  - Heavy sweating
- **First Aid:**
  - Apply firm pressure on cramping muscles or gentle massage to relieve spasm.
  - Give sips of water, if nausea occurs, discontinue water

### HEAT EXHAUSTION

- **Symptoms:**
  - Heavy sweating
  - Weakness
  - Cool, pale, clammy skin
  - Weak pulse
  - Possible muscle cramps
  - Dizziness

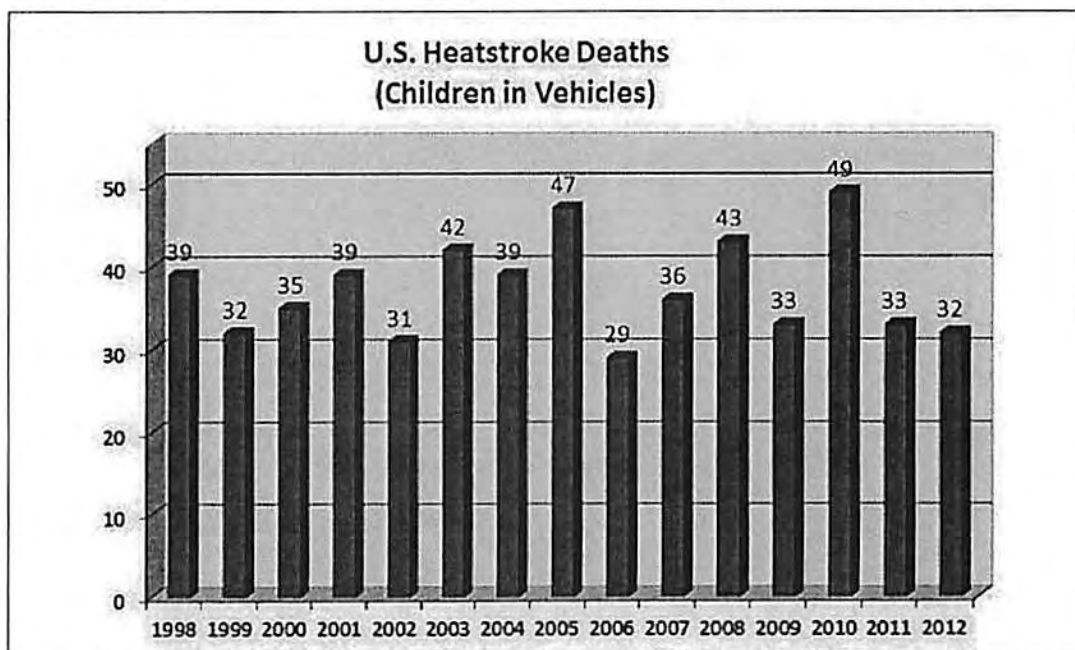
- Nausea and vomiting
- Fainting
- Normal temperature possible
- **First Aid:**
  - Move person to a cooler environment
  - Remove or loosen clothing
  - Apply cool, wet cloths
  - Fan or move victim to air conditioned room
  - Offer sips of water. If nausea occurs, discontinue water. If vomiting continues, seek immediate medical attention.

#### HEAT STROKE (or sunstroke)

- **Symptoms:**
  - Altered mental state
  - Possible throbbing headache, confusion, nausea, dizziness, shallow breathing
  - High body temperature (106°F or higher)
  - Skin may be hot and dry, or patient may be sweating
  - Rapid pulse
  - Possible unconsciousness
- **First Aid:**
  - Heat stroke is a severe medical emergency. Summon emergency medical assistance or get the victim to a hospital immediately. Delay can be fatal.
  - Move the victim to a cooler, preferably air-conditioned, environment
  - Reduce body temperature with a water mister and fan or sponging
  - Use fan if heat index temperatures are below the high 90s
  - Use extreme caution
  - If temperature rises again, repeat process
  - Do NOT give fluids

#### Never Leave Children, Disabled Adults or Pets in Parked Vehicles

Each year, dozens of children and untold numbers of pets left in parked vehicles die from hyperthermia. Hyperthermia is an acute condition that occurs when the body absorbs more heat than it can handle. Hyperthermia can occur even on a mild day. Studies have shown that the temperature inside a parked vehicle can rapidly rise to a dangerous level for children, pets and even adults. Leaving the windows slightly open does not significantly decrease the heating rate. The effects can be more severe on children because their bodies warm at a faster rate than adults.



*Courtesy of San Francisco State University. Use of this graph does not imply NWS endorsement of services provided by San Francisco State University.*

#### How Fast Can the Sun Heat a Car?

The sun's shortwave radiation (yellow in figure below) heats objects that it strikes. For example, a dark dashboard or seat can easily reach temperatures in the range of 180 to over 200°F. These objects (e.g., dashboard, steering wheel, child seat) heat the adjacent air by conduction and convection and also give off longwave radiation (red in figure below) which is very efficient at warming the air trapped inside a vehicle.



Shown below are time lapse photos of thermometer readings in a car over a period of less than an hour. As the animation shows, in just over 2 minutes the car went from a safe temperature to an unsafe temperature of 94.3°F. This demonstration shows just how quickly a vehicle can become a death trap for a child.

#### Objects Heated by the Sun Warm Vehicle's Air



[CLICK HERE FOR ANIMATION \(700K\)](#)  
(Hi-Res ~ 2.5 mb.WMV file)

Individual Frames:

0 min, 10 min, 20 min, 30 min, 40 min, 50 min, 60 min

*Animation Courtesy of General Motors and San Francisco State University. Use of this animation does not imply NWS endorsement of services provided by General Motors and San Francisco State University.*  
Hyperthermia deaths aren't confined to summer months. They also happen during the spring and fall. Below are some examples.

The atmosphere and the windows of a car are relatively transparent to the sun's shortwave radiation (yellow in figure below) and are warmed little. This shortwave energy, however, does heat objects it strikes. For example, a dark dashboard or seat can easily reach temperatures in the range of 180°F to more than 200°F. These objects, e.g., dashboard, steering wheel, childseat, heat the adjacent air by conduction and convection and give off longwave radiation (infrared), which efficiently warms the air trapped inside a vehicle. Learn more about excessive heat and cars.

### Vehicle Related Heat Deaths

- **Honolulu, HI, March 07, 2007:** A 3-year-old girl died when the father left her in a child seat for 1.5 hours while he visited friends in a Waikiki apartment building. The outside temperature was only **81 degrees**.
- **North Augusta, SC, April 2006:** A mother left her 15-month-old son in a car. He was in a car for 9 hours while his mom went to work. She is now serving a 20-year prison sentence.
- **Greenville, TX, December 01, 2012:** A 6-month-old boy died after being left in a car for more than 2 hours by his mother. She was charged with murder. The temperature rose to an **unseasonably warm 81 degrees** on that day.
- **Adults are in danger too.** On July 12, 2001, a man died of heat stroke after falling asleep in his car with the windows rolled up in the parking lot of a supermarket in Hinds County, MS.

### Safety Tips for Concerning Children

- **Make sure your child's safety seat and safety belt buckles aren't too hot** before securing your child in a safety restraint system, especially when your car has been parked in the heat.
- **Never leave your child** unattended in a vehicle, even with the windows down.
- **Teach children not to play in, on, or around cars.**
- **Always lock car doors and trunks--even at home--and keep keys out of children's reach.**
- **Always make sure all children have left the car** when you reach your destination. Don't leave sleeping infants in the car ever

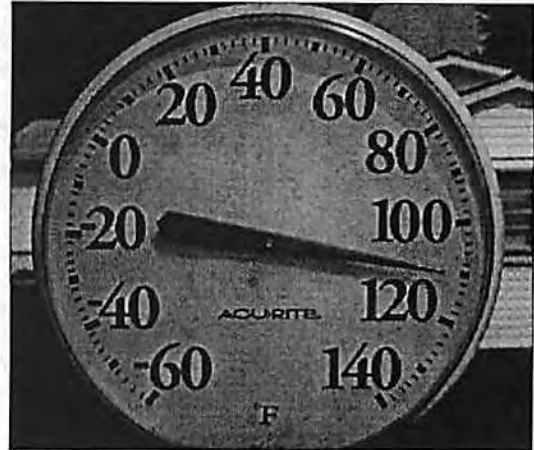
#### Downloadable Child Vehicular Heat Stroke Prevention Logos





### Safety Tips for Adults

- **Slow down.** Reduce, eliminate or reschedule strenuous activities until the coolest time of the day. Children, seniors and anyone with health problems should stay in the coolest available place, not necessarily indoors.
- **Dress for summer.** Wear lightweight, light-colored clothing to reflect heat and sunlight.
- **Put less fuel on your inner fires.** Foods, like meat and other proteins that increase metabolic heat production also increase water loss.
- **Drink plenty of water, non-alcoholic and decaffeinated fluids.** Your body needs water to keep cool. Drink plenty of fluids even if you don't feel thirsty. Persons who have epilepsy or heart, kidney or liver disease, are on fluid restrictive diets or have a problem with fluid retention should consult a physician before increasing their consumption of fluids. **Do not drink alcoholic beverages and limit caffeinated beverages.**
- **During excessive heat periods, spend more time in air-conditioned places.** Air conditioning in homes and other buildings markedly reduces danger from the heat. If you cannot afford an air conditioner, go to a library, store or other location with air conditioning for part of the day.
- **Don't get too much sun.** Sunburn reduces your body's ability to dissipate heat.
- **Do not take salt tablets unless specified by a physician.**



### Preparing for and Responding to Excessive Heat Events

The Excessive Heat Events Guidebook was developed by the Environmental Protection Agency (EPA) in 2006, in collaboration with the National Weather Service, the Centers for Disease Control and Prevention, and the Department of Homeland Security. This guidebook provides best practices for saving lives during heat waves in urban areas, and provides a menu of options that communities can use in developing their own mitigation plans.

### Resources:

- Safety and Health Topics from the Occupational Safety & Health Administration (OSHA)
- Centers for Disease Control and Prevention (CDC)
- American Red Cross
- Federal Emergency Management Agency (FEMA)



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